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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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Application for Patent

Application No.: 09/596,070

Examiner: Nguyen, Cam Linh T.

Filed: June 16, 2000

Group Art Unit: 2171

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Title: RECOMMENDER SYSTEM AND METHOD FOR GENERATING IMPLICIT RATINGS BASED ON USER INTERACTIONS WITH HANDHELD DEVICES

APPELLANTS' BRIEF ON APPEAL

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1. REAL PARTY IN INTEREST

Xerox Corporation (the assignee).

2. RELATED APPEALS AND INTERFERENCES

No other Appeals or Interferences are known to Appellants, Appellants' Legal Representative, or the Assignee which will directly affect, or be directly affected by, or have a bearing on the Board's decision in the pending Appeal.

3. STATUS OF CLAIMS

Claims 1 to 20 are rejected.

4. STATUS OF AMENDMENTS

Appellants' response and request for reconsideration mailed May 27, 2003, was considered but was not deemed to place the application in condition for allowance.

5. SUMMARY OF INVENTION

Appellants' invention is directed, in embodiments, to a system and method for generating item recommendations, which includes providing an item to a device having an application for engaging a repetitive activity with the provided item, wherein the repetitive activity occurs primarily during standalone operation of the device; generating a history of user interaction with the provided item, wherein user interaction comprises engaging in the repetitive activity with the provided item; transforming the history into an implicit rating of the provided item; and using the implicit rating of the provided item to generate recommendations of other items (patent application, [hereinafter, "pa"], page 2, lines 25 to page 3, line 2). The rating comprises predicted ratings for a user for a plurality of items not rated by the user, having a measure of confidence in the prediction and a rationale for the prediction (pa, page 9, line 30 to page 10, line 1).

6. ISSUE

Whether claims 1-20 are unpatentable under 35 USC §103(a) over U.S. Patent No. 6,421,717 (Kloba, et al.) in view of U.S. Patent 6,236,978 (Tuzhilin).

7. GROUPING OF CLAIMS

- I. Claims 1-3, 5, 8-12 stand or fall together.
- II. Claim 4 stands alone.
- III. Claim 6 stands alone.
- IV. Claim 7 stands alone.
- V. Claims 13-20 stand or fall together.

8. ARGUMENT

Appellant's invention provides a solution to the problem of providing personalized recommendations to users who rely on handheld devices for information delivery. Personalization of information delivery is common on the Internet. Personalization of the user's experience is based on user interaction with the site. Explicit user profile data is obtained when the user fills in a registration form, for example. Implicit data on the user is gathered based on user interactions with the site, what the user searches for, what the user buys, etc. Many WWW portals use some form of recommender system to provide further personalization based on users' profiles. Adaptive recommendation techniques mine the collection of users' profiles to find similarities among users. These portal sites can then provide recommendations to users based on what similar users have bought, read, etc.

Handheld devices, such as cellular telephones, PDAs (personal digital assistants), MP3 players and portable reading appliances, are designed primarily for use while not connected to the Internet. Thus, there are limited online interactions from which to mine and provide recommendations. The interactions a user spends with a handheld device while not connected to the Internet provide greater information to a recommender system. For example, in the case of an MP3 player, in which a user downloads ten songs, the fact that ten songs were downloaded is not as important as

the fact that the user spent seventy-five minutes listening to one of the ten songs and only a few minutes listening to the other nine songs.

Appellant's invention generates a history of user interaction with a provided item during standalone operation of the handheld device disconnected from a network (in the case of an MP3 player, Appellant's invention generates a history of which song was played and for how long). This history of user interaction is uploaded to a network recommender, which transforms the history into an implicit rating of the provided item. This rating is used to generate predicted ratings for other items not rated by the user, each rating having a measure of confidence and rationale for the prediction.

Whether claims 1-20 are unpatentable under 35 USC §103(a) over U.S. Patent No. 6,421,717 (Kloba, et al.) in view of U.S. Patent 6,236,978 (Tuzhilin).

Claims 1-20 were rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 6,421,717 to Kloba, et al. ("Kloba") in view of U.S. Patent 6,236,978 to Tuzhilin ("Tuzhilin").

1. Kloba does not teach transforming the history of user interactions into an implicit rating of the provided item.

The Examiner admits in the Final Office Action mailed June 11, 2003 on page 3, "Kloba does not clearly disclose how the system transforms the history into an implicit rating of the provided item which providing advertising objects to the user."

2. Tuzhilin does not teach transforming the history into an implicit rating of the provided item, wherein the history of user interactions with the provided item may be used to create more accurate statistical profiles; Tuzhilin teaches transforming a history of user transactions into rules to be stored as part of a user's profile.

Tuzhilin teaches a method for generating a user profile based on a static profile and a dynamic profile of the user. While the general framework of Tuzhilin is similar to that described in the application (Tuzhilin records user actions and exploits the recorded user actions to ultimately provide recommendations - although the primary emphasis is the exploitation of user actions to generate a user profile), there are

fundamental differences between Tuzhilin and the invention claimed. Tuzhilin's method is based on the "transactions" that occur between a client and a provider (according to Tuzhilin, a transaction may be "credit card transactions, airline reservations and Web site visit transactions." See col. 3, line 65 to col. 4 line 1), while the method of the invention is based on "repetitive user activity" with provided items, "primarily during standalone operation of the device".

The method of Tuzhilin teaches recording transactions, transactions that do not involve repetitive activity with an item disconnected from a network. Transactions require network connectivity. Applicant's method teaches recording repetitive user activity with an item, which activity occurs during standalone operation of the handheld device disconnected from a network. For example, Tuzhilin teaches recording a transaction, such as the online purchase of a CD by a user. Applicant's method teaches recording repetitive user activity, such as how often and when the user listens to the CD and which music cuts the user listens to on the CD.

This difference is significant and indeed Tuzhilin teaches away from Applicant's method, because, as argued by Tuzhilin, the number of transactions for a user can be too small to have any statistical significance ("Because a user may perform only a small number of transactions, the corresponding rules generated may be statistically insignificant, unreliable and insignificant." See col. 4, lines 32-36.). In contrast, Applicant's method collects repetitive user activity with respect to the same item in order to create more accurate statistical information and provide better recommendations of other items. For example, the fact that a user purchased one CD (as recorded by Tuzhilin) does not provide much information about the user's interest in music. The fact that the user listens to three cuts on the CD once a day for a week (as recorded by Applicant's method) provides greater statistical information, information that can be used to recommend other songs by the same artist.

Tuzhilin teaches transforming a history of user transactions into rules to be stored as part of a user's profile. "For example, based on the past purchasing history of a particular user, the PSA service may ascertain that whenever user X goes to France, user X often buys perfume in Paris. This rule is stored as part of the user

profile using the User Profile Generation Module 110." See col. 12, lines 4-8.

3. The combination of Kloba and Tuzhilin does not teach or suggest Appellant's invention as claimed in claim 1, 10 or 13. The combination of Kloba and Tuzhilin teaches generating recommendations from a history of user online activities.

Kloba teaches a system for customizing channels, content and data for download by mobile devices. In Kloba, users with mobile devices connect to a network, select from a group of channels (such as news, weather, sports, etc.) and download content for viewing offline. While Kloba teaches tracking client behavior offline, such as tracking the number of times that a particular user has viewed a particular page or listened to a particular song, the amount of time a user spends viewing a page, or any other client activity, Kloba does not indicate what a provider may do with the tracked information. Indeed, a provider must request that client activity be recorded (col. 17, lines 11-12) and the provider may have to pay compensation for this service (col. 17, line 22).

Tuzhilin teaches recording online transactions and generating purchasing profiles and recommendations from those online transactions. There is no recognition in Tuzhilin of the value of recording offline activities. Indeed, most of the activities (e.g., credit card transactions or Web site visit transactions) tracked by Tuzhilin are not susceptible to tracking offline. As noted above, Tuzhilin teaches away from recording (and therefore using to generate recommendations) offline activities.

The combination of Kloba and Tuzhilin teaches one skilled in the art to generate recommendations and user profiles based on the "online transactions" engaged in by a user of Kloba's system.

4. The specific relationships for generating ratings as claimed in claims 4, 6-7 are not taught or suggested by Kloba or Tuzhilin.

Claim 4 recites that an implicit rating is generated in accordance with the relationship: $\text{rating(item)} = \frac{\text{number of interactions (item) since datetime(item acquired)}}{\text{number of total interactions (item) since datetime(item acquired)}}$.

Claim 6 recites that an implicit rating is generated in accordance with the relationship: $\text{rating(item)} = \frac{\text{total interaction time(item)}}{\text{size(item)}}$.

Claim 7 recites that an implicit rating is generated in accordance with the relationship: rating(item) = [total interaction time(item)/size(item) *exp(- damping coefficient] * (date-time acquired).

Tuzhilin teaches a general rule for generating a dynamic profile that includes individual rules. The dynamic rules as taught by Tuzhilin are directed to generating user profiles and recommendations based on transactions. The specific relationships claimed in claims 4, 6-7 are directed to implicit ratings based on a user interaction comprising an instance of a user causing the application to display or play the provided item to the user and duration of the display or play, wherein each user interaction occurs during standalone operation of the handheld device disconnected from a network. These specific relationships are not taught, or suggested or inherent in either Kloba or Tuzhilin.

In view of the foregoing, Appellants believe that claims 1-20 are patentable over Kloba, et al. in view of Tuzhilin.

CONCLUSION

For the reasons set forth herein, Appellants believe that the claims of the present application are patentable, and accordingly respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's rejections of the claims.

Respectfully submitted,



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9. APPENDIX

1. (Amended) A method for generating recommendations, comprising:

providing an item of a particular type to a handheld device having an application for engaging in a repetitive activity with items of the particular type, wherein the repetitive activity comprises displaying or playing items of the particular type to a user;

generating a history of user interaction with the provided item, wherein a user interaction comprises an instance of a user causing the application to display or play the provided item to the user and duration of the display or play, wherein each user interaction occurs during standalone operation of the handheld device disconnected from a network;

uploading the history of user interactions to a network recommender;

transforming the history into an implicit rating of the provided item, wherein the history of user interactions with the provided item may be used to create more accurate statistical profiles, the rating comprising predicted ratings for a user for a plurality of items not rated by the user, having a measure of confidence in the prediction and a rationale for the prediction; and

using the implicit rating of the provided item to generate recommendations of other items of the particular type.

2. (Original) The method of claim 1, wherein the device is selected from the group consisting of a personal digital assistant, an audio player, and an electronic document viewer.

3. (Original) The method of claim 1, wherein the history of user interactions is transformed into recency and frequency of interaction data pertaining to the provided item.

4. (Original) The method of claim 3, wherein an implicit rating is generated in accordance with the relationship:

rating(item) = number of interactions (item) since datetime(item acquired) / number of total interactions (item) since datetime(item acquired).

5. (Original) The method of claim 1, wherein the history of user interactions is transformed into data pertaining to normalized time spent interacting with the provided item.

6. (Original) The method of claim 5; wherein an implicit rating is generated in accordance with the relationship: rating(item) = total interaction time(item)/size(item).

7. (Original) The method of claim 5, wherein an implicit rating is generated in accordance with the relationship:

rating(item) = [total interaction time(item)/size(item) *exp(- damping coefficient] * (date-time acquired).

8. (Original) The method of claim 1, wherein the history of user interactions is transformed into binary classification data comprising an interaction and no interaction.

9. (Original) The method of claim 1, further comprising providing a user profile for a user associated with the device and modifying the user profiled based on the history.

10. (Amended) A method for generating recommendations, comprising:

providing a plurality of items of a particular type to a plurality of handheld devices, each device having an application for engaging in a repetitive activity with items of the particular type, wherein the repetitive activity comprises displaying or playing items of the particular type to a user;

generating for each provided item in each device, a history of user interaction with the provided item, wherein a user interaction comprises a user causing the application to display or play the provided item to the user and duration of the display or play, wherein each user interaction occurs during standalone operation of the handheld device disconnected from a network;

uploading the history of user interactions to a network recommender;

transforming the history for each provided item into an implicit rating of the provided item, wherein the history of user interactions with the provided item may be used to create more accurate statistical profiles, the rating comprising predicted ratings for a user for a plurality of items not rated by the user, having a measure of confidence in the prediction and a rationale for the prediction; and

using the implicit ratings of the provided items to generate recommendations of other items of the particular type.

11. (Original) The method of claim 10, wherein the items comprise music tracks, the devices comprise audio players and the history of user interaction comprises a record of track identifier and time spent listening.

12. (Original) The method of claim 10, wherein the items comprise electronic books, the devices comprise electronic book viewers and the history of user interaction comprises a record of book identifier and normalized time spent reading.

13. (Amended) A system for providing recommendations, comprising:

a plurality of devices, each device having an application for engaging in a repetitive activity with items of the particular type, wherein the repetitive activity comprises displaying or playing items of a particular type to a user, and a memory for storing a history of each user interaction with an item of the particular type with the device, wherein a user interaction comprises a user causing the application to display or play a selected item to the user and duration of the display or play and wherein each user interaction occurs during standalone operation of the handheld device disconnected from a network; and

a recommendation service for storing downloaded histories of items interacted with from the plurality of handheld devices, for transforming the downloaded histories into implicit ratings of the items interacted with, wherein the history of user interactions with the provided item may be used to create more accurate statistical profiles, and for generating recommendations of new items of the particular type based on the implicit ratings, the ratings comprising predicted ratings for a user for a plurality of items not rated by the user, having a measure of confidence in the prediction and a rationale for the prediction.

14. (Original) The system of claim 13, wherein the recommendation service further stores downloaded user profiles from participating users on the system.

15. (Original) The system of claim 14, wherein the recommendation service generates recommendations to participating users based on the participating user's profile and the implicit ratings.

16. (Original) The system of claim 13, wherein the recommendation service generates implicit ratings from the histories of user interactions based on binary classifications.

17. (Original) The system of claim 16, wherein the binary classification comprises accessing and not accessing an item.

18. (Original) The system of claim 13, wherein the recommendation service generates implicit ratings from the histories of user interactions based on recency and frequency of interaction with the items.

19. (Original) The system of claim 13, wherein the recommendation service generates implicit ratings from the histories of user interactions based on normalized time spent interacting with the items.

20. (Original) The system of claim 13, wherein the devices are selected from the group consisting of personal digital assistants, audio players and electronic document viewers.